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THE
ONTARIO WATER RESOURCES
COMMISSION

WATER POLLUTION SURVEY

of the

TOWN OF BONFIELD

DISTRICT OF NIPISSING

1972

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REPORT
ON A
WATER POLLUTION SURVEY
OF THE
TOWN OF BONFIELD
DISTRICT OF NIPISSING

DISTRICT ENGINEERS BRANCH
DIVISION OF SANITARY ENGINEERING

JANUARY 1972

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R E P O R T

THE ONTARIO WATER RESOURCES COMMISSION

INTRODUCTION

The Ontario Water Resources Commission is concerned with the management of the province's water resources as they are related to the needs of water supply, wastewater disposal and other areas of use. In keeping with this responsibility staff of the OWRC examine water quality in areas of active and potential use. This survey was made to locate and record any significant sources of water pollution in the Town of Bonfield and to make recommendations concerning their abatement.

In July and August of 1971, water samples for bacteriological and chemical examination were collected from surface waters and all of the known discharges to these waters. The results of certain analyses and information collected by the North Bay and District Health Unit are also used in this report. The appendix to the report includes the results of the samples collected in July and August 1971, an interpretation of the various tests, and an outline of water quality and effluent objectives in Ontario. A map of the town showing the sample point locations is also appended.

Previously, a similar type of survey was carried out on July 28, 1964, which was prompted by the Ontario Department of Transportation and Communications. At the time it was planning the reconstruction of the local highways and was interested in information related to future servicing.

The conclusion of the original survey report recommended that private septic tank and tile bed systems be investigated and where necessary, corrected under the direction of the local health authorities.

This recent survey was carried out at the request of the Department of Health. The area within the Town of Bonfield was reported as not being suited to private sewage disposal systems, a fact which has resulted in the contamination of private wells and the pollution of water-courses and ditches.

I GENERAL

(1) Location

The Town of Bonfield is located at the northeast end of Lake Nosbonsing, at the source of the Kaibuskong River, which is 17 miles east of the City of North Bay and 2 miles south of Highway No. 17. This lake-river system feeds the Mattawa River a tributary of the Ottawa River.

(2) Description

The town was originally a link in the lumbering drive from Lake Nipissing to the Ottawa River but in recent times has changed to that of a farming community with a seasonal tourist trade. Presently, the population is approximately 630. A large percentage of the working population is employed in North Bay as there is no local industry. Commercial establishments within the town consist of a post office, 3 garages and 2 stores. There are 2 schools and 1 church. The C.P.R. line from North Bay to Mattawa passes through the town.

(3) Topography

The Town, which is spread over approximately 60 acres, varies widely with respect to elevation and soil characteristics. The overburden in some areas is

a fine sandy clay while in other locations there are limited gravel deposits. In most of the developed areas there is little depth of overburden and rock outcropping is frequent.

(4) Drainage

This is effected by natural watercourses and open roadside ditches as there is no storm or sanitary sewer system. At the time of the inspection, which was during a dry season, there was little water in some of the roadside ditches and watercourses. For this reason, in certain locations, it was only possible to collect a small volume of water, sufficient only for bacteriological examination. It was evident that many of the ditches, which were dry at the time, do carry a considerable flow in the spring and fall. Generally speaking, the town area slopes steeply to the lakeshore which results in a rapid runoff.

II WATER USES

(1) Water Supply

The majority of homes within the town receive water from private wells or springs. In most cases the wells are very shallow with limited capacity. Some wells supply more than one home when there is sufficient ground water.

Because of limited overburden and the size of lots, wells are frequently located adjacent to septic tank and tile bed systems or other disposal areas. This situation has led to well contamination and associated health problems. During this survey, 12 samples were collected from private well systems to evaluate their bacteriological condition. For information on bacteriological examination refer to the appended glossary. Four of these samples contained coliform organisms. However, none contained faecal coliform organisms. Personnel of the North Bay and District Health Unit were contacted and they indicated that a 1969 survey of wells within the town, conducted by themselves, revealed that of the 80 well supply samples collected, 49 contained coliform bacteria.

(2) Recreational

Lake Nosbonsing and the Kaibuskong River, to which it drains, are used extensively for resort purposes

such as boating, swimming and fishing. A shore area within the town, at the foot of Church Street, is used as a public beach and park during the summer months. The town also maintains a beach and a park on the Kaibuskong River at the control dam some 3,000 feet downstream.

III WATER POLLUTION

(1) Sanitary Waste Disposal

Sewage within the town is disposed of on a private basis by means of septic tank and tile bed systems, cesspools and pit privies. The disposal is made difficult by shallow overburden, rock outcropping and the proximity of wells. This investigation revealed evident discharges of sewage to street ditches. Some homes have drainage pipes which lead directly to the roadside ditches. The North Bay and District Health Unit reported that during their 1969 survey of the town the following facts were noted:

No. of houses	-	98
Population	-	448
Sanitary Disposal Methods - Septic tank and		
Tile Bed Systems	-	58
- Outdoor privies	-	17
- Cesspools	-	23

Assuming that all of the septic tank - tile bed systems are operating properly, it is still evident that twenty-three per cent of the disposal methods are unacceptable; however, it is factual that because of native soil, rock and ground water characteristics, septic tank and tile bed disposal systems frequently do not function properly and have resulted in the contamination of adjacent water supplies, roadside ditches and watercourses.

(2) Refuse Disposal

Refuse is disposed of nearby in the township by a landfill operation. There was no evidence that this operation may have adverse effects on surface waters in the area.

IV ANALYSES RESULTS AND INTERPRETATION

The laboratory results of bacteriological examination and chemical analysis of the samples collected from the ditches, the Kaibuskong River and Lake Nosbonsing are appended to this report.

All bacteriological samples were submitted to and examined by the Public Health Laboratory in North Bay, while all chemical samples were analysed at the OWRC laboratory in Toronto.

A plan of the Town of Bonfield and surrounding area is appended. The plan indicates the approximate location of all sampling points with respect to streets and landmarks.

Five of the eight samples collected from the river and lake, upon bacterial examination, indicated a concentration of total coliform organisms less than 1000 per 100 ml and faecal coliform organisms less than 100 per 100 ml. These samples fall within this Commission's objectives for recreational waters. However, three of these samples did contain either total coliform organisms in excess of 1000 per 100 ml. or faecal coliform organisms in excess of 100 per 100 ml. Concentrations of this magnitude usually indicate the presence of sewage. Generally, river and lake samples fell within the objective with respect to total kjeldahl nitrogen. The generally accepted maximum limit for this

parameter is 0.5 ppm. However, the usually accepted maximum limit of total phosphorus is in the vicinity of 20 ppb as P for natural surface waters. This limit is generally observed as restricting excess algae growth. It is noted that the sample collected from the lake effluent at the dam contained a total phosphorus concentration which was considerably higher than that of the upstream lake water. This would indicate that the community is contributing a substantial amount of phosphorus to the river system.

Ten water samples collected from ditches within the town indicated relatively high bacteria counts. Considering 1000 coliform bacteria per 100 ml. and 100 faecal coliform bacteria per 100 ml. as a maximum allowable limit, nine samples exceeded the objective. All of the samples contained faecal coliform bacteria, a fact which indicates that domestic sewage gains access to the ditches.

Boisvert Street, which visibly displays evidence of disposal problems, contains several discharge pipes to the roadside ditch. This road ditch connects a natural creek to the lakeshore. The ditch sample from the bottom of this street indicated a BOD_5 of 34 ppm which far exceeds the generally accepted allowable range for surface waters. Total coliform bacteria counts, at this

location, were 210,000/100 ml. with faecal coliforms in the region of 182,000/100 ml. This ditch sample similarly showed adverse levels of phosphorus and nitrogen which indicates a sewage disposal problem. High bacterial levels further upstream in this ditch, are substantiated by 5 examination results which are appended.

Ditch sample analysis results further indicate bacterial and nutrient pollution in the vicinity of Trunk Road and Railway Street and at the junction of Mark and Levesque Streets, however, flows at these locations were minimal.

It should be noted that at the time of the sampling there had been little recent rainfall, the water table within the town, being at its lower level, was allowing a better behaviour of tile bed disposal systems. Some drain pipes lead directly to the roadside ditches; however, due to the dryness, liquids were being readily absorbed by the soil preventing the collection of samples. It is evident when viewing local watercourses and ditches within the town that spring and fall rains do cause substantial surface flows which must further impair subsurface ground disposal.

The existing situation in the town is a health hazard as contaminants are being discharged to areas of recreation, to public road ditches, and have gained access

to private wells. The present ground water supplies within the town are for the most part inadequate with respect to quantity and quality.

It would, therefore, seem reasonable that a communal water supply system should be established. Because of unsatisfactory soil conditions, it is unlikely that adequate domestic waste treatment may be obtained by the continued use of septic tank and tile bed systems. If the domestic waste disposal problem cannot be corrected on an individual basis, a communal sewage collector and treatment system would be the only solution. However, the scattered location of homes, the extent of bedrock and rolling terrain would result in an expensive collector system.

Although the present condition of Lake Nosbonsing appears to be acceptable, there is definitely a threat to the effluent portion of the lake and to the Kaibuskong River, owing to the unsatisfactory sewage treatment facilities and disposal methods. Because of the existence of recreational areas it is necessary that this problem receive the warranted attention.

V SUMMARY AND CONCLUSIONS

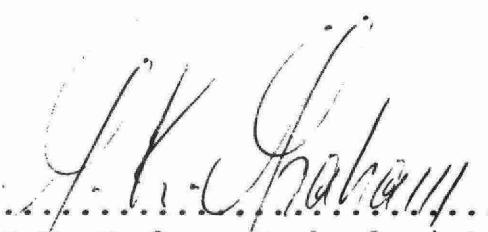
A water pollution survey of the Town of Bonfield was conducted on July 6 and August 31, 1971.

In general the condition of the adjacent lake and river appeared to be acceptable; however, there was evidence of pollution in the Town's watercourses. The absence of treatment facilities or the malfunctioning of septic tank systems result in the discharge of untreated or inadequately treated sewage to drainage ditches and streams. There is also evidence of the contamination of private wells in this area. In addition, these wells are generally inadequate with respect to capacity.

It would appear that a communal water supply is necessary in this case and that a communal sewage collector and treatment system may be the only alternative if the operation of private disposal systems cannot be corrected.

VI RECOMMENDATIONS

1. A programme should be initiated, involving the construction of a communal water supply and distribution system for the town.
2. Expansion within the Town of Bonfield should be allowed only where proposed sewage disposal methods have passed stringent requirements as laid down by the local health authorities.
3. If malfunctioning disposal systems cannot be corrected in the future then a sewage collector system with a treatment facility should be proposed.

Prepared by:..........
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District Engineers Branch
Division of Sanitary Engineering

GLOSSARY OF TERMS

BACTERIOLOGICAL EXAMINATIONS - The Most Probable Number Technique is used by the Ontario Department of Health to obtain an approximation of the actual number of coliform organisms present. The Membrane Filter Technique is used by the OWRC to obtain a direct count of coliform organisms. These organisms are the normal inhabitants of the intestines of man and other warm-blooded animals. They are always present in large numbers in untreated sewage and are, in general, relatively few in other stream pollutants. The OWRC objective for recreational waters in Ontario is a total coliform count not greater than *1000 per 100 ml and a faecal coliform count not in excess of *100 per 100 ml.

*A geometric mean density of at least 10 samples collected per month.

BIOCHEMICAL OXYGEN DEMAND (BOD) - The biochemical oxygen demand test indicates the amount of oxygen required for stabilization of the decomposable organic matter found in sewage, sewage effluent polluted waters, or industrial wastes, by aerobic biochemical action. Discharges of oxygen consuming wastes (BOD or COD) should be limited to a level which will not cause depression of dissolved oxygen concentrations below 6 mg/l in receiving waters supporting cold water fisheries and 5 mg/l in receiving waters supporting warm water fisheries.

SOLIDS - The analyses for solids include tests for suspended and dissolved solids. The total solids is a measure of the solids in solution and in suspension. Suspended solids indicate the measure of undissolved solids of organic or inorganic nature whereas the dissolved solids are a measure of those solids in solution.

TOTAL KJELDAHL - is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia Nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

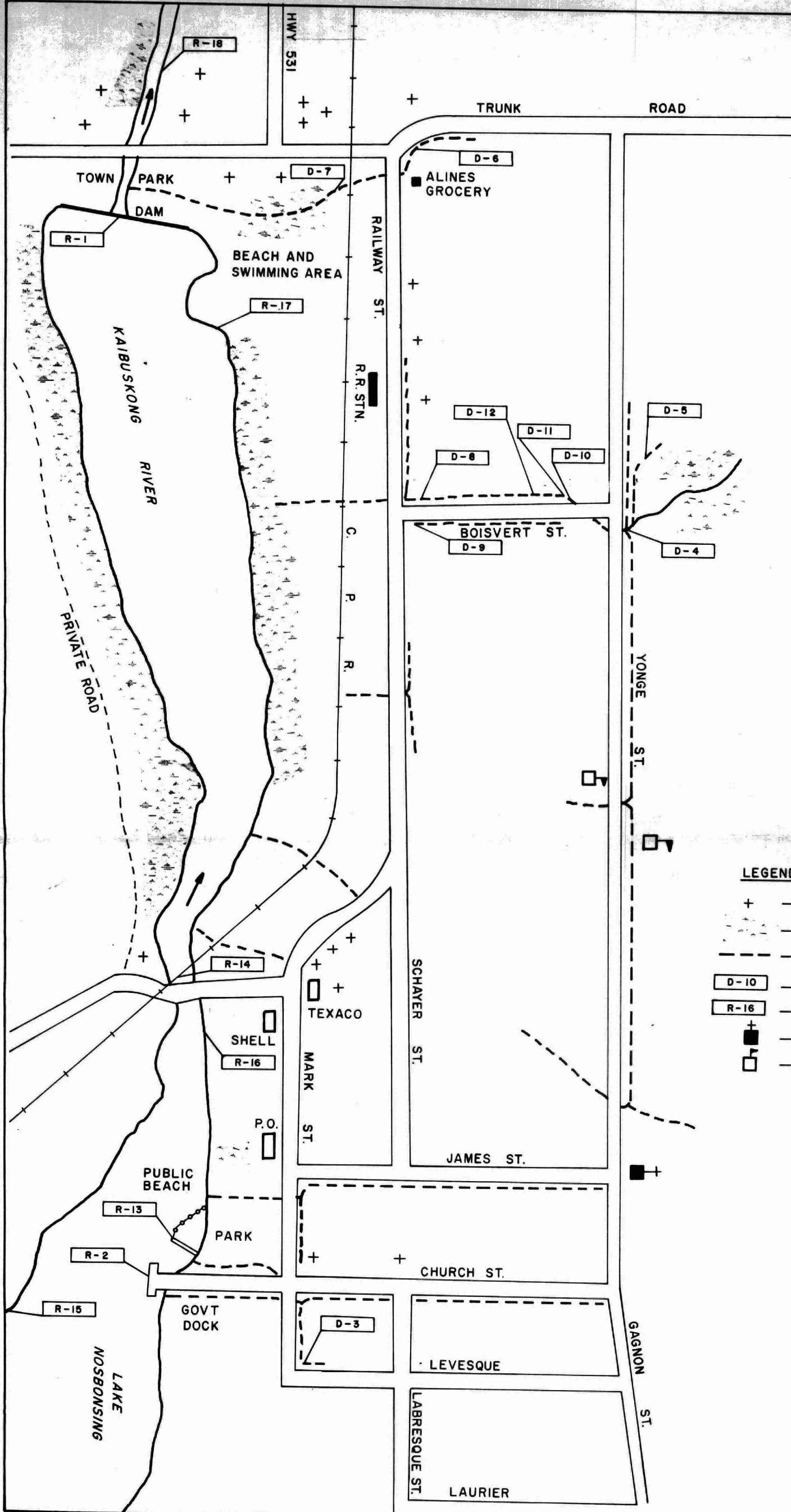
TOTAL PHOSPHORUS - Phosphorus in relatively small concentrations is common in natural fresh waters. Total phosphorous concentrations of 0.01 ppm and less will not encourage algae growth. This is generally held as a maximum desired limit.

TOWN OF BONFIELD

CHEMICAL AND BACTERIOLOGICAL ANALYSES OF DITCH AND RIVER WATER SAMPLES

SAMPLE POINT NUMBER	DESCRIPTION	DATE	5-DAY BOD (ppm)	<u>SOLIDS (ppm)</u>		<u>NITROGEN AS N (ppm)</u> TOTAL KJELDAHL	<u>PHOSPHORUS AS P (ppm)</u> TOTAL	<u>M. P. N.</u>	
				TOTAL	SUSP.			TOTAL COLIFORM ORGANISMS /100 ml	FAECAL COLIFORM ORGANISMS /100 ml
R - 1	River at effluent dam	July 6/71	1.8	70	5	0.60	0.48	45	10
R - 2	Lake Nosbonsing at Government Dock	"	1.2	80	5	0.42	0.012	28	14
D - 3	Ditch at North corner of Mark & Levesque Streets	"	-	-	-	-	-	80,000	8,000
D - 4	Ditch at 30" C.I. culvert at Jct. Yonge & Boisvert Sts.	"	4.5	120	5	0.61	1.7	74,000	12,000
D - 5	Ditch on North Side of Yonge Street west of Boisvert Street	"	-	-	-	-	-	48	46
D - 6	Ditch at N/E corner of Trunk Road & Railway Street	"	3.5	250	10	1.1	0.44	7,600	2,100
D - 7	Ditch at Conc. box culvert under RR S. of Jct. of Railway Street & Trunk Road	"	-	-	-	-	-	182	136
D - 8	Ditch at culvert under Railway Street at Boisvert Street	"	34.0	260	15	11.0	3.8	210,000	182,000
D - 9	Ditch at N/E corner Boisvert & Railway Streets	"	-	-	-	-	-	230,000,000	210,000,000

SAMPLE POINT NUMBER	DESCRIPTION	DATE	5-DAY BOD (ppm)	SOLIDS (ppm)		NITROGEN AS N (ppm) TOTAL KJELDAHL	PHOSPHORUS AS P (ppm) TOTAL	M. P. N.	
				TOTAL	SUSP.			TOTAL	FAECAL
								COLIFORM ORGANISMS /100 ml	COLIFORM ORGANISMS /100 ml
D - 10	Ditch on north side of Boisvert Street	July 6/71	-	-	-	-	-	43,000	1,700
D - 11	Ditch on north side of Boisvert Street	"	-	-	-	-	-	114,000	7,000
D - 12	Ditch on North side of Boisvert Street	"	-	-	-	-	-	33,000	10,900
R - 13	Lake at Public Beach at foot of James Street	"	-	-	-	-	-	34	6
R - 14	River at RR Bridge & Road Overpass	"	1.6	70	5	0.39	0.044	40	36
R - 15	South-west Shore of Lake, ½ mi. from RR Bridge	"	1.4	80	15	0.35	0.028	900	210
R - 16	Lake behind Shell Station	"	-	-	-	-	-	2,200	180
R - 17	River at Public Beach adjacent to Dam	"	-	-	-	-	-	310	310
R - 18	River, 1000 ft. north of Dam	"	1.8	70	5	0.54	0.048	22	20



LEGEND

- + — ROCK OUTCROP
- SWAMP
- - - CULVERT
- D-10 — DITCH SAMPLING POINT
- R-16 — RIVER " "
- CHURCH
- SCHOOL

ONTARIO WATER RESOURCES COMMISSION	
TOWN OF BONFIELD	
WATER POLLUTION SURVEY	
1972	
SCALE: NOT TO SCALE	
DRAWN BY: R.S.	DATE: JANUARY 1972
CHECKED BY:	DRAWING NO: 72-6-DE